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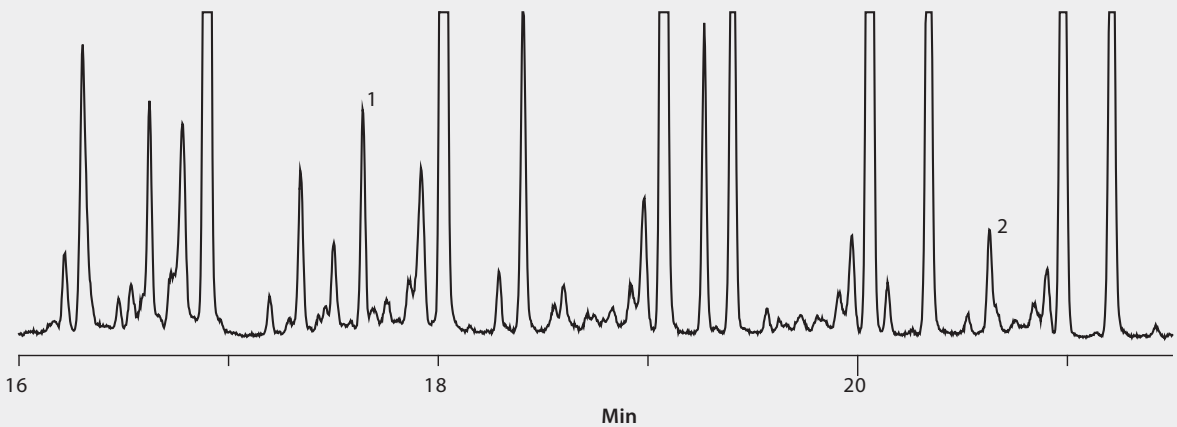
GC Analysis of Tetrahydrocannabinol (THC) and Carboxytetrahydrocannabinol (THCCOOH) in Surface Water on SLB®-5ms after SPME using 50/30 µm DVB/Carboxen/PDMS Fiber, On-Fiber Derivatization

Cannabis is a Schedule 1 substance under US federal law. However, at the time of this writing, four US states have legalized it for recreational and medical use. The level of use by the general public is typically determined through questionnaires and crime statistics, but this approach may not give an accurate assessment. Sewage epidemiology seeks to correlate data from these surveys with actual levels found in wastewater. In the case of cannabis, this can be done by analyzing for the psychoactive substance, tetrahydrocannabinol (THC), and its major metabolite, carboxytetrahydrocannabinol (THCCOOH). THC can be analyzed by GC directly, but because THCCOOH contains an acid group in its structure it requires derivatization. Thus, if the two compounds are analyzed together, derivatization must be used. In this application, solid phase microextraction (SPME) with post-extraction, on-fiber derivatization was used for low level analysis of THC and THCCOOH from surface water prior to separation on an SLB®-5ms GC column. Cerilliant CRMs provided reliable quantification.

market focus	Environmental; Forensics and Toxicology
sample preparation	SPME
sample/matrix	8 mL surface water in 10 mL vial, adjusted to pH 2 with HCl, spiked with THC and THCCOOH at 50 ng/L each compound
SPME fiber	StableFlex™ SPME Fiber, DVB/CARBOXEN-PDMS, 2 cm
extraction	immersion, 60 min, 60 °C
desorption process	260° C, 3 min
sample preparation	post-extraction derivatization: 500 µL MSTFA in 10 mL vial, headspace, 30 min, 60 °C
sample preparation	fiber post-bake: 10 min, 270 °C
column	SLB-5ms: 20 m x 0.18 mm I.D., 0.18 µm (28564-U)
oven	90°C (3 min), 20 °C/min to 200 °C, 3 °C/min to 300°C (5 min)
inj. temp.	260 °C
detector	MSD
MSD interface	325 °C
scan range	SIM:THC: m/z=303, 371(quant), 386;THCCOOH: m/z=371 (quant), 473, 488
carrier gas	helium, 1 mL/min constant flow
injection	splitless
liner	0.75 mm SPME
Application No.	G1006527

1. Tetrahydrocannabinol (THC) TMS derivative (50 ng/L spike)
2. 11-nor-9-Carboxytetrahydrocannabinol (THCCOOH) TMS derivative (50 ng/L spike)



Related Products

accessory
Headspace vial, screw top, rounded bottom (vial only) (Supelco SU860099)
Inlet Liner, Direct (SPME) Type, Straight Design (unpacked) (Supelco 2637501)
Magnetic Screw Cap for Headspace Vials, 18 mm thread (Supelco SU860101)
analytical column
SLB®-5ms Capillary GC Column (Supelco 28564-U)
reagent
N-Methyl-*N*-(trimethylsilyl)trifluoroacetamide (Sigma-Aldrich 69479)

Related Products

SPME fiber
SPME fiber assembly Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS) (Supelco 57348-U)
standard
(±)-11-nor-9-Carboxy-Δ^9-THC solution (Cerilliant T-006)
(±)-11-nor-9-Carboxy-Δ^9-THC-D_3 solution (Cerilliant T-004)
(–)-Δ^9-THC solution (Cerilliant T-005)
(–)-Δ^9-THC-D_3 solution (Cerilliant T-003)